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238. ON THE MIOCENE PECTINIDAE FROM THE ENVIRONS OF SENDAI; PART 3. TWO MIOCENE PECTENS*

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中新世帆立貝の 2 新種について（仙台附近中新統産 Pectinidae, その 3）：茂庭層から新に，*Placopecten nomurai* 及び *Chlamys kumanodôensis* の 2 種を記載し，*Placopecten nomurai* と *Placopecten protomollitus* (NOMURA) との関係に就いて述べた。 増田孝一郎

Introduction and Acknowledgements

The scallops herein described were collected by the writer from the granule conglomerate at the basal part of the Miocene Moniwa formation developed near the Kumano Shrine, Kumanodô, Takadate-mura, Natori-gun, and from the coarse grained sandstone at the basal part of the same formation at the type locality of the Moniwa formation, which is at Moniwa, Oide-mura, Natori-gun, both in the southern border of Sendai City, Miyagi Prefecture. These newly collected scallops represent new species and their descriptions are presented herein.

The Moniwa formation from where the scallops were collected occupies the lowest marine unit of the Miocene Natori group, which had been already described by J. IWAI (1949, pp. 23–27), and the full paper is now in press (S. HANZAWA, et al. in press).

Acknowledgements are due to Dr. Kotora HATAI of the Department of Geology, College of Education, Tôhoku University, for kindly supervising the present work.

* Read Dec. 6, 1952; received Feb. 26, 1953.

Description

Family Pectinidae

Subfamily Pectininae

Genus *Placopecten* VERRILL, 1897

Placopecten nomurai MASUDA, n. sp.

Pl. 8, Figs. 1a–c, 2a–b, 3a–b, 4a–b, 5, 6a–b.

1940. *Pecten* (*Chlamys*) *protomollitus* NOMURA, *Sci. Rep., Tôhoku Imp. Univ., Ser. 2, vol. 21, no. 1*, p. 17, pl. 11, figs. 7, 8, 9. (not *Pecten* (*Pecten*) *protomollitus* NOMURA, *Saito Ho-on Kai Mus., Res. Bull., no. 6*, p. 41, pl. 6, fig. 3. Type locality. Hotatebuchi, Hitotsumori, Akaishi-mura, Nishi-Tsugaru-gun, Aomori Prefecture: Tanosawa formation, Miocene).

Shell rather small, thin, compressed, orbicular, subequilateral; the valves somewhat smooth, but radiately ribbed; pointed at top, forming an angle of about 100°. Right valve with a great number (about 50 or more) of fine, faint, close-set, flat-topped, smooth radial threads and usually with intercalary threads, both crossed by concentric fine growth lines; the radials are wider than the interspaces and usually tend

to bifurcate at about the upper half of disc length; intercalary threads usually appear at about same time as the bifurcation of radials and rarely split into two riblets near margin; intercalaries nearly equal to main radial threads in strength at margin. Left valve more convex than right, provided with numerous, faint, fine, close-set, flat-topped, smooth radial threads, and also rarely with intercalary threads; radials wider than interspaces and usually split into two riblets at about half of disc length. Auricles of right valve subequal in size, though the anterior is a little larger than the posterior; anterior furnished with a distinct byssal notch and narrow byssal area, and ornamented with distinct radial threads which rarely bifurcate and of concentric lines; posterior with distinct radial threads and concentric lines which make auricles appear imbricated. Anterior auricle in left valve with wide and shallow byssal notch which is a little larger than the posterior and sculptured with distinct, somewhat imbricated radials, being similar in sculpture with the posterior. Hinge of right valve with more or less strong ctenolium and distinct cardinal crura and deep resilial pit provided with distinct lateral ridges. Left valve with hinge provided with socket which correspond to lateral ridges of resilial pit of right valve. Internal surface smooth, except for marginal serration.

Dimensions (in mm).—

Valve	Right*	Right	Right	Left	Left	Left
Height	42	36	20	45	43	32
Length	41	35	19	45	40	29
Hinge-length	14	—	9	15	15	12
Depth	4	3	1.5	8	8	5
Apical angle	100°	100°	100°	100°	100°	95°

* Holotype specimen.

Type locality and geological horizon.—Stream floor of small tributary of the Natori River at Moniwa, Oide-mura, Natori-gun, Miyagi Prefecture (lat. 38°13′N., long. 140°47′E.). Moniwa formation. Early Miocene.

Depository.—Department of Geology, College of Education, Tôhoku University, Sendai, Japan. Reg. No. 1041.

Remarks.—This species is characterized by its orbicular shape and thin shell which is provided with numerous, fine, close-set, flat-topped, dichotomous radial threads and intercalary threads, and by the strong cardinal crura. The left valve is characterized by rarely having intercalary threads, by the radials being wider than their interspaces and also by the thin shell.

Placopecten clintonius SAY, according to W. C. MANSFIELD (1936, pp. 186–187, pl. 22, fig. 4) is without a defined type locality, but its true type locality may be "Old Kings Mill Wharf on the north shore of the James River, Virginia". Whatever be the case, *clintonius* SAY resembles *nomurai* in its general features, but can be distinguished by its smaller shell, less obtuse byssal notch and less numerous radial threads. Another similar species is *Placopecten setanaensis* KUBOTA (1950, pp. 183–185, pl. 7, figs. 1–4), from the Pliocene (?) Setana formation of southwestern Hokkaido, but *nomurai* can be distinguished therefrom by the larger shell, non-dichotomizing radials and by the obtuse byssal notch.

Placopecten nomurai was referred by S. NOMURA (1940, p. 17) to his *Pecten (Pecten) protomollitus*, which he first described from the Miocene Tanosawa formation in western Aomori Prefecture and subsequently reported it from the Miocene Moniwa formation in the southern border of Sendai City, Miyagi Pre-

fecture.

The original description of S. NOMURA's *protomollitus* is as follows.—

"Shell small, about 40 mm. in height, orbicular, strongly compressed nearly equilateral; surface with fine, close-set, somewhat imbricated radial threads, some of which are slightly larger than the others in regular intervals. The smaller threads are generally three in number in the interspace between the larger ones. Interior smooth. Height, 39 mm."

According to S. NOMURA, the shell is characterized by its orbicular outline, which is subtransparent and provided with fine and regular disposed radial threads.

The characteristics of *Placopecten protomollitus* diverge from the specimens from the type locality of the Moniwa formation, especially in the type of radial threads between the interspaces, thus a new name has been given to them. *Protomollitus* from the Miocene Tanosawa formation in Aomori Prefecture, the holotype of the species, can be distinguished from the Moniwa specimens by having unequal radials, some of which are slightly larger than the others in regular intervals and the smaller threads are generally three in number in the interspaces between the larger ones.

Genus *Chlamys* (BOLTEN) RÖDING, 1798

Chlamys kumanodôensis MASUDA, n. sp.

Pl. 8, Figs. 8a-b, 9a-b, 10a-b, 11a-b.

Shell small, rather thick, compressed, suborbicular, equilateral except for auricles, subequivalve, although the left slightly exceeds the right in convexity; valves smooth but radiately ribbed; auricles imbricated. Right valve with numerous (about 50) faint, fine, round-topped, close-set, smooth radial threads and fine concentric growth lines; obtuse net-work present on lateral area; radial threads much wider than interspaces, rarely dichotomous and very rarely with intercalary threads; anterior auricle of right valve much larger and longer than the posterior and provided with deep byssal notch; upper half of anterior auricle with only concentric lines and its lower half with a few strong radials; posterior auricle sculptured similarly as anterior; hinge straight and with distinct cardinal crura and ctenolium; resilial pit wide and shallow. Ribs of left valve similar to those of right; anterior auricle much larger than posterior and sculptured with radial riblets, and provided with wide and shallow byssal notch; hinge with strong cardinal crura corresponding to that of right valve. Internal surface usually smooth, but sculptured with fine serration near ventral margin.

Dimensions (in mm).—

Valve	Right*	Right	Right	Left	Left	Left
Height	46	38	49	37	34	41
Length	43	36	47	35	31	36
Hinge-length	18	18	17	14	15	15
Depth	7	6	7	8	6	6
Apical angle	95°	95°	90°	95°	90°	95°

* Holotype specimen.

Type locality and geological horizon.—Hill side about 500 m west of the Kumano Shrine, Kumanodô, Takadate-mura, Natori-gun, Miyagi Prefecture (lat. 38°11′5″ N., long. 140°50′40″ E.). Moniwa formation. Early Miocene.

Depository.—Department of Geology, College of Education, Tôhoku University, Sendai, Japan. Reg. No. 1049.

Remarks.—This new species of *Chlamys* is distinguishable from both *Placopecten protomollitus* (NOMURA) and *P. nomurai* MASUDA, n. sp., by the thicker test, larger anterior auricle, characteristic cardinal crura and also by the sculpture of the radial threads. *Chlamys islandicus* (MÜLLER) (ARNOLD, 1906, pp. 113–114, pl. 45, figs. 1, 1a) is also related to the present new species, but can be distinguished therefrom by the size of the shell, the square and less number of radial threads, the type of multiplication of the ribs which is by bifurcation and intercalation, the more pronounced imbrication of the left valve and by the posterior auricle being a little over one-half as long as the anterior one.

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Explanation of Plate 8

Figs. 1a-c. *Placopecten nomurai* MASUDA, n. sp. Holotype. Reg. No. 1041. a, Right valve, ×1. b, Inner surface of 1a, ×1. c, A part of the outer surface of 1a, ×3. Loc. Stream floor of a small tributary of the Natori River at Moniwa, Oide-mura, Natori-gun, Miyagi Prefecture.

Fig. 2. *Placopecten nomurai* MASUDA, n. sp. Paratype. Right valve, ×1. Loc. Same as above.

Fig. 3. *Placopecten nomurai* MASUDA, n. sp. Hinge area of right valve, ×1. Loc. Same as above.

Figs. 4a-b. *Placopecten nomurai* MASUDA, n. sp. Paratype. a, Right valve, ×1. b, Hinge area of 4a, ×1. Loc. Same as above.

Figs. 5a-b. *Placopecten nomurai* MASUDA, n. sp. Paratype. a, Left valve, ×1. b, A part of the outer surface of 5a, ×3. Loc. Same as above.

Fig. 6. *Placopecten nomurai* MASUDA, n. sp. Paratype. Inner surface of left valve, ×1. Loc. Same as above.

Fig. 7. *Placopecten nomurai* MASUDA, n. sp. Paratype. Left valve, ×1. Loc. Same as above.

Fig. 8. A part of the holotype of *Placopecten protomollitus* (Nomura), ×3. Loc. Hotatebuchi, Hitotsumori, Akaishi-mura, Nishi-Tsugaru-gun, Aomori Prefecture. Saito Ho-on Kai Museum, Reg. No. 6086.

Figs. 9a-b. *Chlamys kumanodôensis* MASUDA, n. sp. Holotype. Reg. No. 1049. a, Right valve, ×1. b, Hinge area of 9a, ×1. Loc. Hill side about 500 m. west of the Kumano Shrine, Kumanodô, Takadate-mura, Natori-gun, Miyagi Prefecture.

Figs. 10a-b. *Chlamys kumanodôensis* MASUDA, n. sp. Paratype. a, Right valve, ×1. b, Hinge area of 10a, ×1. Loc. Same as above.

Figs. 11a-b. *Chlamys kumanodôensis* MASUDA, n. sp. Paratype. a, Left valve, ×1. b, Hinge area of 11a, ×1. Loc. Same as above.

Figs. 12a-b. *Chlamys kumanodôensis* MASUDA, n. sp. Paratype. a, Left valve, ×1. b, Hinge area of 12a, ×1. Loc. Same as above.

PROCEEDINGS OF THE PALAEONTOLOGICAL SOCIETY OF JAPAN

「日本古生物学会第54回例会」昭和28年6月6日九州大学第一分校地学教室に於て開催す（参会者23名）。

1. 東亞産古生代植物化石 *Emplectopteridium* について（代読）……浅間一男
2. 宮崎層群産 Umboniidae……首藤次男
3. A new Cymatoceratid from Palaeogene of Kyushu, Japan（代読）……小林貞一
4. アンモナイトの分布を支配した 2-3 の要因について……大山 桂
5. A nearly smooth Pachydiscid from Hokkaido, Japan……斎藤林次 松本達郎
6. *Canadoceras* from the Japanese Province……松本達郎
7. 高知県横倉山産ゴットランド紀小腕足類2種について（予報）……野田光雄
8. On the Komaspidae（代読）……小林貞一
9. 宮崎県宮崎郡田野町産カニ化石（代読）……今泉力蔵
10. On the Two New Fossil Elephants from Western Kyushu, Japan ...高井冬二 井上正昭

「日本古生物学会第55回例会」昭和28年10月10日東北大学理学部地質古生物学教室に於て開催す（参会者30名）。

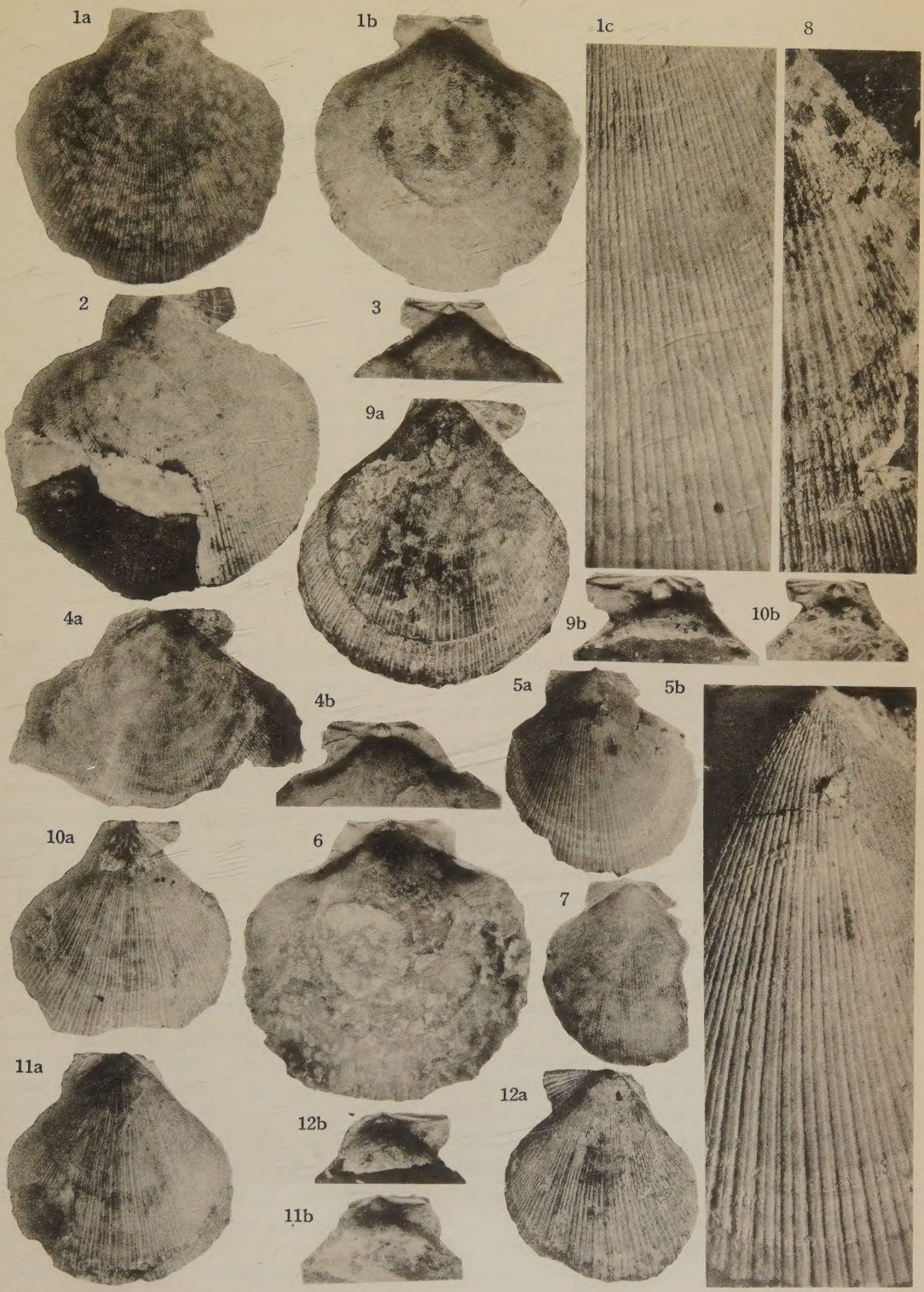
1. 岐阜県赤坂町金生山産二疊紀石灰藻化石（代読）……遠藤隆次
2. 熊本県矢山岳地方の上部古生代石灰藻化石（代読）……遠藤隆次
3. Some Permian Lime-secreting Algae from Kosaki formation of Central Kyushu, Japan（代読）...Kenji KONISHI
4. Electron-microscopic fine structure of fossil diatoms. I-II……Haruo OKUNO
5. 本渓湖産 *Neuropteridium* に就て...浅間一男
6. 岩手県久慈附近産白堊紀石炭の花粉化石……島倉巳三郎
7. 常盤炭田の五安層植物群と中山層植物群（代読）……藤岡一男・小檜山元
8. 朝鮮新第三紀植物化石（その5）（代読）……藤岡一男
9. Discovery of *Nelumbo* from the Asuwa Flora (Upper Cretaceous) in Fukui Prefecture, the Inner side of Central Japan（代読）……松尾秀邦
10. Miocene Foraminifera from Noto Peninsula……浅野 清
11. Oligocene Foraminifera from Utsunai, Tombetsu-mura, Hokkaido ……浅野 清
12. 秋田油田船川層下部の有孔虫化石...岩佐三郎
13. 秋田県雄勝郡田代村梨ノ木峠産の有孔虫新種について（代読）……村田茂雄
14. *Euconospira* with Color Pattern from the Permian of Japan（代読）...早坂一郎
15. 大沢峠（福島県相馬郡駒ガ嶺村）産淡水産介化石について……菅野三郎
16. 松川浦（福島県相馬郡）に於ける貝類の生態分布（予報）……小高民夫・鎌田泰彦・早坂祥三
17. On the Miocene Pectinidae from the Environs of Sendai Part 5 & Part 6...... Koichiro MASUDA
18. A New Palaeogene paracenoceratoid from Southern Kyushu, in Japan（代読）..... Teiichi KOBAYASHI
19. Découverte de *Tmetoceras* dans le plateau de Kitakami au nord du Japon（代読）.....Tadashi SATO
20. A New Classification of the Conchostraca（代読）.....Teiichi KOBAYASHI
21. 佐賀県小城郡南多久村長尾西端部産芦屋層群産の Ctenochales 化石……今泉力蔵

SHORT NOTES

1. New Name, *Jeholaspis*

Teiichi KOBAYASHI

Prof. F. RASETTI of the Johns Hopkins University kindly informed me of the homonymy of his *Pseudosaukia* (*Jour. Pal. Vol. 18*, 1944, p. 252) with mine (*Trans. Proc. Pal. Soc. Japan, N.S. No. 3*, 1952, p. 78). Here *Jeholaspis* is proposed for *Pseudosaukia* KOBAYASHI, 1952.



K. KUMAGAI, Photo.

Trans. Proc. Palaeont. Soc. Japan. N.S., No. 12, pp. 89—95, Pl. 9, Dec. 10, 1953

239. *HAMLETELLA*, A NEW PERMIAN GENUS OF BRACHIOPODA, AND A NEW SPECIES FROM THE KITAKAMI MOUNTAINS, JAPAN*

ICHIRÔ HAYASAKA

Hokkaidô University

二疊紀腕足類新属 *Hamletella*: 北上山地中部の二疊系と称せられる地層中に産した *Streptorhynchus* に似た形の，腕足類は，Timor の？ *Str. altus* HAMLET と共に，*Meekella* に特有な一対の平行な delthyrial supporting-plates を備えている。HAMLET はそれを新属とすべきであろうとの意見であつたが，資料不足のためさし控えた。Timor と北上とに別々に発見されたのだから，HAMLET の考は正しいとされなければならぬと思うので，新属名 *Hamletella* を提案し北上のものを新種 *H. kitakamiensis* として記載した。なおカウカサス北部の上部二疊系中から LICHAREW が *Str. altissimus* として報告した標本は，形は全く北上のものと同様であるが，beak を切つて調べたら，delthyrial supporting-plates が発見されそうな気がする。そうすればこれも *Hamletella* となり，恐らくは北上産のものと同一の種になるであろう。 早坂一郎

〔I〕 The sub-family ORTHOTETINAE WAAGEN is an interesting group of brachiopoda, richly represented in the younger Paleozoic formations of all the world by a number of species belonging to several genera. Definitions of genera differ more or less according to paleontologists. As to the validity of certain genera opinions are not unanimous.

In 1910 Ivor THOMAS published an important paper on the classification of the ORTHOTETINAE based on the study of numerous Carboniferous fossils from various British localities.[1] The inner structure of the ventral valve is laid greatest stress upon as the features characterizing different genera in his system, though, of course, the growth habit of shells is regarded important. The subfamily is first divided into two groups, one with a median septum in the ventral valve, and the other lacking it. As features of secondary importance the delthyrial supporting-plates (that is, the dental plates of older usuage)[2] come under consideration. According to this principle the group with a median septum is classified into *Derbyia*, *Orthotetes* and *Geyerella* according to the different developmental features of the delthyrial supporting-plates.

The group without a median septum includes *Streptorhynchus*, *Schuchertella*, *Meekella* and *Schellwienella*. In the first two of these genera the delthyrial supporting-plates are "rudimentary or absent", while in the other two they are "well-developed." *Streptorhynchus* is characterized, among others, by having a high and distorted pedicle valve, while *Schuchertella* has a low, regular pedicle valve.

Twenty years later, in 1930, B. LICHAREW's paper discussing the structure and classification of the sub-family ORTHOTETINAE appeared.[3] He refers

* Read Feb. 28, 1953; received March 4, 1953.

not only to the classification proposed by THOMAS, but also to that schemed by TOLMACHOFF,[4] the original work of which is not accessible to the present writer. TOLMACHOFF seems to have laid a little more stress on the growth habit of shells as a character useful for classification. According to LICHAREW TOLMACHOFF arranged the genera in the following way.

I. Forms with median septum in the ventral valve.
   1) Smooth forms ..... *Orthotetes*
   2) Plicated forms ..... *Geyerella*
II. Forms devoid of a median septum.
   1) Smooth forms:
      a) Dental plates absent or quite rudimentary ... *Streptorhynchus*
      b) Dental plates always present and sometimes attaining considerable dimension .... *Orthotetina*
   2) Plicated forms..... ..... *Meekella*

To LICHAREW the present writer owes also his knowledge on the classification of the same sub-family by FREDERICKS who schemed his system quite independently of opinions available at that time. The external features of shells were rather highly appreciated as taxonomic characters also by FREDERICKS. Following is his classification according to LICHAREW.

I. Apical apparatus undeveloped;
   Shell striated ..... *Streptorhynchus*
II. Apical apparatus rudimentary (Delthyrial keels); shell striated..... .. *Schuchertella*
III. Apical apparatus fundamental (apical plates):
   a) Apical plates free
      Shell striated ..... *Orthotetina*
      Shell striately-plicated ... *Meekella*
   b) Apical plates fused to form a spondylium:
      Shell striated .....
      ..... *Orthotetes* (*Derbyia*)
      Shell striately-plicated .....
      ..... *Geyerella*

Following discussions on the structural patterns and on the affinities among different genera, as well as on the classifications, LICHAREW gives his own idea which is summarized as follows.

I. Dental plates reduced or feebly developed:
   1. Simple median septum feebly developed and not reaching to the deltidium ..... *Streptorhynchus*
   2. Simple median septum strongly developed and remaining in contact with the deltidium for a more or less considerable extent..... ..... *Derbyia*
II. Dental plates strongly developed and reaching to the floor of the valve:
   1. Dental plates remaining separated from each other ..... *Meekella*
   2. Dental plates fused together to form a biseptum ..... *Orthotetes*

〔II〕 From what has been summarized above we can rather easily distinguish each of the allied genera from others.

In an extensive collection of the Permian fossils from the Kitakami Mountains accumulated in the Department of Geology and Mineralogy, Hokkaido University, there are many interesting species of brachiopods. The writer here takes up one of them in order to demonstrate that there is another combination of structural elements different from those found in the genera hitherto known in the sub-family ORTHOTETINAE. In general appearance the specimen very closely resembles *Streptorhynchus altissimus* LICHAREW found in the Lower Permian fauna of Northern Caucasus.[5] In his paper of 1932, quoted here, LICHAREW describes the following 6 species and 1 questionable one of *Streptorhynchus*, 4 of *Derbyia*, 3

and 1 questionable of *Meekella*, and 4 species and 1 variety of *Omboina* within the sub-family ORTHOTETINAE are described, and the systematic relations and morphological characters are discussed briefly. Of these *Streptorhynchus altissimus* is an outstanding species possessing an extremely high or elongate ventral beak with a narrow and high ventral area or interarea which is orthocline in the sense of SCHUCHERT and COOPER.[6] The species is fully described in both Russian and English texts. Measurements are given in the Russian text, giving the size of the holotype as: 42mm., 26 mm., and 16 mm. in length, width and thickness, respectively, whereas the dorsal valve is 24 mm. long. In the description of the inner structure no mention is made of the dental plates or delthyrial supporting-plates while other details are given.

Remembering, moreover, that LICHAREW discussed the structural features and affinities of the genera of ORTHOTETINAE in 1930 paper, there should not be any doubt that it is a *Streptorhynchus*.

The Kitakami specimen coincides with the Caucasian species in all the observed features and dimensions, except for the fact that it possesses a pair of parallel delthyrial supporting-plates that are very distinctly shown as parallel slits on the back side of the high area, the specimen being an inner mold.

As far as the mode of development of delthyrial supporting-plates is concerned the Japanese specimen has to be classed with *Meekella* rather than *Streptorhynchus* according to the classifications current among paleontologists. In other words, with respect to the development of parallel delthyrial supporting-plates it is a *Meekella*, but it has a high, more or less curved beak which is characteristic of a *Streptorhynchus*.

This may be regarded as an accidence in the development of the inner structure of ORTHOTETINAE, because the genera of this sub-family are considered very closely allied to each other. Especially when there is only one specimen examined it can involve whatever meaning possible. It may be simply called an anomaly, or an exception, or, it may possibly be regarded as a hybrid preserved by chance.

However, when there is a second specimen with the same "anomalous" peculiarity or peculiarities the meaning becomes quite different. Especially when two occurrences take place either at different horizons of the geological formations, or at more or less remote localities the meaning of the second occurrence is often very important. In such a case the probability of the "anomalous" form being exceptional or pathologic accidence may become very small.[7]

As a matter of fact, the combination of the elongate and distorted *Streptorhynchus* shell and the parallel pair of delthyrial supporting-plates of *Meekella* was recognized by HAMLET in the collection of the Permian brachiopods of Timor she examined and described. In "Permische Brachiopoden, Lamellibranchiaten und Gastropoden von Timor",[8] 1928, there is a new species "*? Streptorhynchus altus*" of which she discussed its generic position. In external features it is a *Streptorhynchus*, being characterized by an extremely high area and a slightly twisted beak. It is with this Timorese species that LICHAREW compared his *Streptorhynchus altissimus*, the name implying that the triangular area is much higher than in the former. HAMLET put a question-mark before the generic name *Streptorhynchus* because she found, by cutting, a pair of "Zahn-

stütze" inside the beak portion of the ventral valve. The "Zahnstütze" or delthyrial supporting-plates begin at a short distance from the apex of the shell, and are not in touch with the area. This conforms with the definition of the delthyrial supporting-plates of Ivor THOMAS who proposed that the term "dental plates" or Zahnstütze should be replaced.

〔III〕 Be it what it may, it is a fact that there is a form of brachiopod having a *Streptorhynchus* appearance with *Meekella*-like delthyrial supporting-plates in the Permian formations of Timor and the Kitakami Mountains. LICHAREW referred to the Timorese species of HAMLET, and regarded it a valid species of the genus *Streptorhynchus* notwithstanding HAMLET herself was suspicious of its validity because of the development of the delthyrial supporting-plates. In reality HAMLET seems to have hesitated to propose a new generic name for her species, perhaps because the discussions and opinions on the inner structures, especially of the development of the Zahnstütze had not been clear enough to her. She concludes her description of *? Streptorhynchus altus* with the following sentence. "Wahrscheinlich gehören die Stücke überhaupt in ein neues Genus, das wohl nur permische Vertreter aufweisen wird."[9]

Now, the validity of the type of brachiopod represented by species from remote corners of the world being recognized, a generic name becomes necessary for them. In order to remember HAMLET's merit in anticipating the establishment of a new genus the present writer would propose ***Hamletella***, taking the Timorese species *? Streptorhynchus altus* as genotype. It is described by HAMLET in detail, so that there is no need of recapitulation in this place.

〔IV〕 The Timorese species, ***Hamletella alta*** is thoroughly described and illustrated in HAMLET's 1928 paper. The Japanese species differs from it in certain features. For instance, its ventral valve is much more elongate, and consequently its area decidedly higher than those of the former, while the hinge-line is much longer in relation to the width of the shell than in *H. alta*. However, as the Kitakami material is only a single, more or less deformed specimen, it is possible that these and other differences may not be found absolute ones if some more specimens could be examined. At any rate the Kitakami specimen coincides with the North Caucasian *Streptorhynchus altissimus* LICHAREW in all the features except the delthyrial supporting-plates, as stated above. That is, what distinction LICHAREW recognized between the Timorese and Caucasian forms holds just as well between the former and the Japanese species. Thus, the present writer considers it reasonable to regard it a species different from the genotype, at least for the time being, and he proposes to call it ***Hamletella kitakamiensis*** nov.: it is described in the following lines.

Family STROPHOMENIDAE, KING, 1848

Sub-family ORTHOTETINAE, WAAGEN, 1884

Genus ***Hamletella*** nov.

Diagnosis: ORTHOTETINAE with high and usually distorted ventral beak, lacking median septum, but developing a pair of parallel delthyrial supporting-plates: surface ornamented with fine radial striae crossed by faint growth wrinkles.

Genotype: "*? Streptorhynchus altus*" HAMLET, 1928, from the Permian of Timor.

Hamletella kitakamiensis nov. sp.

Pl. 9, Figs. 1–2

A single inner mold of an almost complete individual at hand: it is rather small and more or less deformed, but more important characters are quite well observed.

Ventral or pedicle valve is long, slightly convex except the anterior part which is flat or slightly cancave: it has a very high area which is more than half of the total shell lengh: pointed apically and rounded in front: beak slightly twisted, and not bilaterally symmetric. Area high, triangular, orthocline,[10] that is, flat and on the same plane as the plane of commissure of valves: with a narrow but distinct and rather prominent pseudodeltidium occupying the axial part of area. A pair of thin, parallel delthyrial supporting-plates appears at some distance from the apex of the shell: they extend foreward to reach to about the middle of the distance between the apex and the hinge-line. Hinge-line straight, slightly shorter than the maximum breadth of the shell which lies across about the middle of the dorsal or brachial valve. Dorsal valve is convex and elongately oval with the straight posterior edge or the hinge-line. Anteriorly and antero-laterally the valve slopes down rather abruptly in correspondence to the flat or slightly concave anterior part of the ventral valve. A pair of rather long cruras and a short cardinal process are represented along the hinge margin as respective slits.

Surface of the specimen, that is, the impression of the inner surface of shells, are run by minute radial striae, counting about 17–18 in a distance of 5 mm almost at the central part of the specimen: they are in alternation with equally distinct interspaces: a similar striation might have covered the shell surface. A few low, wide growth wrinkles are observed.

Dimensions: The specimen is an almost complete individual, but is slightly broken at anterior and apical ends. The dimensions given below are just as they are measured.

Length	44 mm
Breadth	20.5 mm
Thickness	ca. 10 mm
Height of area	23 mm
Hinge-line	17 mm
Height of dorsal valve	ca. 22 mm

Observations: Compared with the genotype, *Hamletella alta*, the present Japanese species differs from it, as stated elsewhere, in having a decidedly longer hinge-line: notwithstanding, the relative height of area of the latter far surpasses that of the former. The beak of the Timorese specimen is much more inflated than the Kitakami species as well as the Caucasian species (*Streptorhynchus*). Concerning the surface sculpture HAMLET remarks that 4-5 thin radial striae occur between thicker ones. However, HAMLET's specimens preserve shell substance, and consequently the striation of the very surface of shell seems to be preseved. A comparison between this and the striation of the Kitakami specimen may not be of any sense.

Coming back to *Streptorhynchus altissimus* LICHAREW once more, the writer is anxious for a clearer recognition of the real character of the species. Had the species a pair of delthyrial supporting-plates which might happen to be found at some levels different from the cut-edges examined by LICHAREW, then it is nothing but the new species described

in this note. Then, in consequence, the specific name should be *Hamletella altissima* (LICHAREW). The fact that the development of the delthyrial supporting-plates in HAMLET's species from Timor was rather neglected by LICHAREW in his discussion on the affinity of *Streptorhynchus altissimus* in 1932, as referred to elsewhere, keeps the writer of this paper more or less sceptic about the characterization of his new species.

Locality: At the height of 460 m above sea level in the valley of Budô-zawa, a tributary of Katchi-zawa, Setamai-machi, Kesen-gun, Iwate Prefecture,* H. SUETOMI made an extensive collection of fossils while he was engaged in the stratigraphical and structural research of the region. In the collection there are many interesting forms including brachiopods and molluscs, among others. The occurrence of a "*Waagenoceras*" *intermedium* WANNER[11] is of special interest.

Geological horizon: Katchizawa stage of Kanôkura series,** Middle Permian.

Depository: Department of Geology and Mineralogy, Faculty of Science, Hokkaidô University, Sapporo, Japan.

〔V〕 The validity of *Hamletella* as a new genus accepted, the diagnostic tables of classification of the genera of the sub-family ORTHOTETINAE by different paleontologists have to be supplemented with it. Below, the table schemed by Ivor THOMAS[1] is reproduced with a change due to the incertion of *Hamletella* by the side of *Meekella*.

1. With median septum.
   - i. Delthyrial supporting-plates not forming a chamber in the umbonal region ..... *Derbyia*
   - ii. Delthyrial supporting-plates fused together into a septum and forming a comparatively small pyramidal chamber in the umbonal region. Septum extends forward for some distance ..... *Orthotetes*
   - iii. Delthyrial supporting-plates extending to nearly the middle of the shell and merging into a Septum to form a very elongate chamber ..... *Geyerella*
2. Without median septum.
   - i. Delthyrial supporting-plates rudimentary or absent:
     - a. Pedicle valve high and usually distorted. Hinge-line very short. Cardinal process high and without a very transverse base. Shell usually rather globose. Area of brachial valve very rudimentary or absent ..... *Streptorhynchus*
     - b. Pedicle valve low and regular. Hinge-line rather long. Cardinal process comparatively low and with a very transverse base, the crural plates curving outwards. Shell usually non-globose. Area of brachial valve small ..... *Schuchertella*
   - ii. Delthyrial supporting-plates well-developed:
     - a. Delthyrial supporting-plates relatively very elongate, usually reaching nearly to the center of the shell, and sub-parallel in direction.
       - a*a*. **Pedicle valve high and distorted** ... *Hamletella*
       - a*b*. **Pedicle valve low and regular** ..... *Meekella*
     - b. Delthyrial supporting-plates relatively short, and diverging ..... *Schellwienella*

It is worthy of note in this place that all these genera but *Schuchertella* are

* 岩手県気仙郡世田米町合地沢支谷 葡萄沢 海抜 460 米の地点

** 叶倉統合地沢階

represented in the faunas of the Anthracolithic formations of Japan. They are considered useful for the world-wide bio-stratigraphical correlation.

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9. *Ditto*, p. 10.
10. In both *? Streptorhynchus altus* and *Str. altissimus* area appears to be either anacline or catacline (see note 6). Whether this difference in the degree of inclination of area is of taxonomic value or not is not clear. In this paper it is not laid stress on this point as a distinctive feature of species.
11. This species of WANNER was considered generically different from *Waagenoceras* by MILLER, 1933, who proposed a new name *Hanieloceras*: he considers it to represent the most advanced stage of the ammonoids of *Cyclolobus-Waagenoceras* group (*Amer. Jour. Sci. vol. 24*). This will be described together with some other Permian ammonoids in another paper.

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KUMANO, Photo.

Explanation of Plate 9

Figs. 1, 2, 1a, 2a. *Hamletella kitakamiensis* nov. sp.

1, dorsal view to show a narrow but prominent pseudo-deltidium, a pair of rather long cruras, marginal flattening of dorsal valve, and so forth.

2, ventral view showing a pair of delthyrial supporting-plates.

1a is enlarged twice natural size to compare with the similarly magnified *Streptorhynchus altissimus* LICHAREW, fig. 3.

2a is magnified two times in order to show the development of the delthyrial supporting-plates more distinctly.

Fig. 3. *Streptorhynchus altissimus* LICHAREW, reproduced from LICHAREW's paper, 1932, for comparison with the Japanese species *Hamletella kitakamiensis*, fig. 1a.

Figs. 4, 5. *Hamletella alta* (HAMLET), reproduced from HAMLET's treatise, 1928.

4, dorsal view.

5, areal view.

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 12, pp. 97—102, Pl. 10, 1 text-fig., Dec. 10, 1953

240. A FIND OF *PSEUDASPIDOCERAS* FROM HOKKAIDO, JAPAN
(Studies on the Cretaceous Ammonites from Hokkaido and Saghalien—II)*

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&

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北海道より *Pseudaspidoceras* の発見：菊石類 Mammitinae と Vascoceratidae とは地中海（テチス）区域に多いが，日本には矢部により *Mammites* sp. が報ぜられ，*Fagesia kotoi* が記載された以外は稀である。

今回北海道石狩国空知川本流沿い下金山橋下の露出から，Mammitinae に属する *Pseudaspidoceras* が，僅か 1 個だが発見されたので，その記載と産出層準をここに報ずる。このものは従来知られた種類中 *P. salmuriense* COURTILLER や *P. armatum* PERVINQUIÈRE に近似だが，それらより螺環の生長がおそいし，住房の肋の分布間隔が広い。後記の点では，印度産 *P. footeanum* (STOLICZKA) に似るが，それは殻形のちがいが甚しい。従つて材料がやや不備ではあがる，新種とみとめ，*P. sorachiense* の名を与えた。この産地は当地における上部蝦夷層群の下部に相当し，同一層並びに近接層から，*Mesopuzosia pacifica* MATSUMOTO MS, *M. yubarense* (JIMBO), *Inoceramus hobetsensis* NAGAO & MATSUMOTO, *In. incertus* JIMBO を産し．ギリヤーク統上部階の恐らく比較的下部に当る。従つて外国での本属の産出（主に下部 Turonian）と調和的である。

松本達郎・橋本　亘

From the literatures which the writers have ever examined the ammonites belonging to the subfamily Mammitinae (HYATT, 1900) and Vascoceratidae (H. DOUVILLÉ, 1911) are very common in the Cretaceous Mediterranean region or the so-called Tethys Sea. In Japan a *Mammites* zone was once established by H. YABE (1909, 1927) at the lowest horizon of the "Upper Ammonites beds" of Hokkaido. However only *Mammites* sp. and *Fagesia kotoi* YABE were listed respectively as the representatives of the Mammitinae and Vascoceratidae, but the designated species were not common. The zone was said to contain three species referable to *Romaniceras* of the subfamily Acanthoceratinae. Superjacent to the "*Mammites* zone" the "*Yezoites* beds" (at first called the *Scaphites*** beds) and "*Parapachydiscus*" beds were established by the same author.

Many geologists in the Cretaceous area of Japan have since sought in vain for fossils belonging to the genus *Mammites*. In reality the subfamily *Mam-*

* Read Dec. 6, 1952; received March 12, 1953.

** The names *Scaphites* and *Anapachydiscus* are preferable in the present state of our knowledge.

mitinae is very scarce in the Japanese province. Through the biostratigraphical research on the Cretaceous of the standard area in Hokkaido and Saghalien T. MATSUMOTO (1942–43) made it clear that *Scaphites* or "*Yezoites*" has a relatively wide stratigraphical range, sometimes together with *Romaniceras* and sometimes together with *Barroisiceras* or even with *Kossmaticeras*. He established instead the zone of *Inoceramus hobetsensis* and the superjacent zone of *Inoceramus uwajimensis*. The characteristic ammonites in the former are *Tragodesmoceroides subcostatus* MATSUMOTO and *Romaniceras* spp. while those in the latter are *Kossmaticeras theobaldianum* KOSSMAT and *Damesites damesi* (JIMBO) which first appeared here but ranges further upwards. *Scaphites* spp., *Scalarites* spp. and *Anagaudryceras limatum* YABE are common to both zones. The former represents the upper Gyliakian stage, approximate correlative of the Turonian and the latter the lower Urakawan stage, approximate correlative of the Coniacian.

In T. MATSUMOTO's collection *Mammites* has not been detected but a few specimens of *Fagesia* were identified. He reported *Fagesia thevestensis* PERON from Division IIc (α) of the Abeshinai district, Teshio Province, Hokkaido (T. MATSUMOTO 1942–43). This horizon is the lower part of the upper Gyliakian. Upon reexamination of the original specimen of H. YABE (1903), MATSUMOTO, furthermore, arrived at the conclusion that *Fagesia kotoi* YABE is very probably a synonym of *Fagesia thevestensts* PERON*. The specimen was collected from a pebble from the Yubari river, Ishikari Province, Hokkaido, so its exact horizon in the field is hardly determined. In the meanwhile three species of *Fagesia* were reported by F. M. ANDERSON (1931) from the middle Chico beds (i. e. the Turonian equivalent) in the Pacific coastal region of North America.

When W. HASHIMOTO was in 1951 engaged in the geological survey of the Yamabe-Kanayama district, Sorachi-gun, Ishikari Province, Hokkaido, he fortunately found another mammitid, which seemed quite new to Japan. It was sent to T. MATSUMOTO for the detailed identification. The same locality and its neighbourhood were revisited by the two authors together with Mr. K. FUJII of Kyushu University in summer 1952. Although further material of the same species was not obtained on this occasion the horizon from which the fossil occurred was determined with confidence.

As the general geology of the district is to be reported as an explanation text for geological map, Sheet Yamabe in scale 1:50,000, only the essential facts relating to the occurrence of the fossil under consideration will be given here. The Cretaceous strata in this district are intensely folded and nearly vertical or steeply inclined with a general trend of N–S. The fossil was collected from the mudstone exposed on the left side of the Sorachi below the Shimo-Kanayama bridge. The continuous outcrop is conventionally called No. KY 301 and is subdivided into beds a to f as is illustrated in fig. 1. The fossil was actually found in KY 301b. The outcropping rock is the black mudstone of about 40 m. thick. Although many calcareous nodules are contained in the mudstone, fossils are not well preserved. However large puzosiid ammonites referable to *Mesopuzosia yubarense* (JIMBO) em. and

* A similar opinion was already presented by PERVINQUIÈRE (1907)

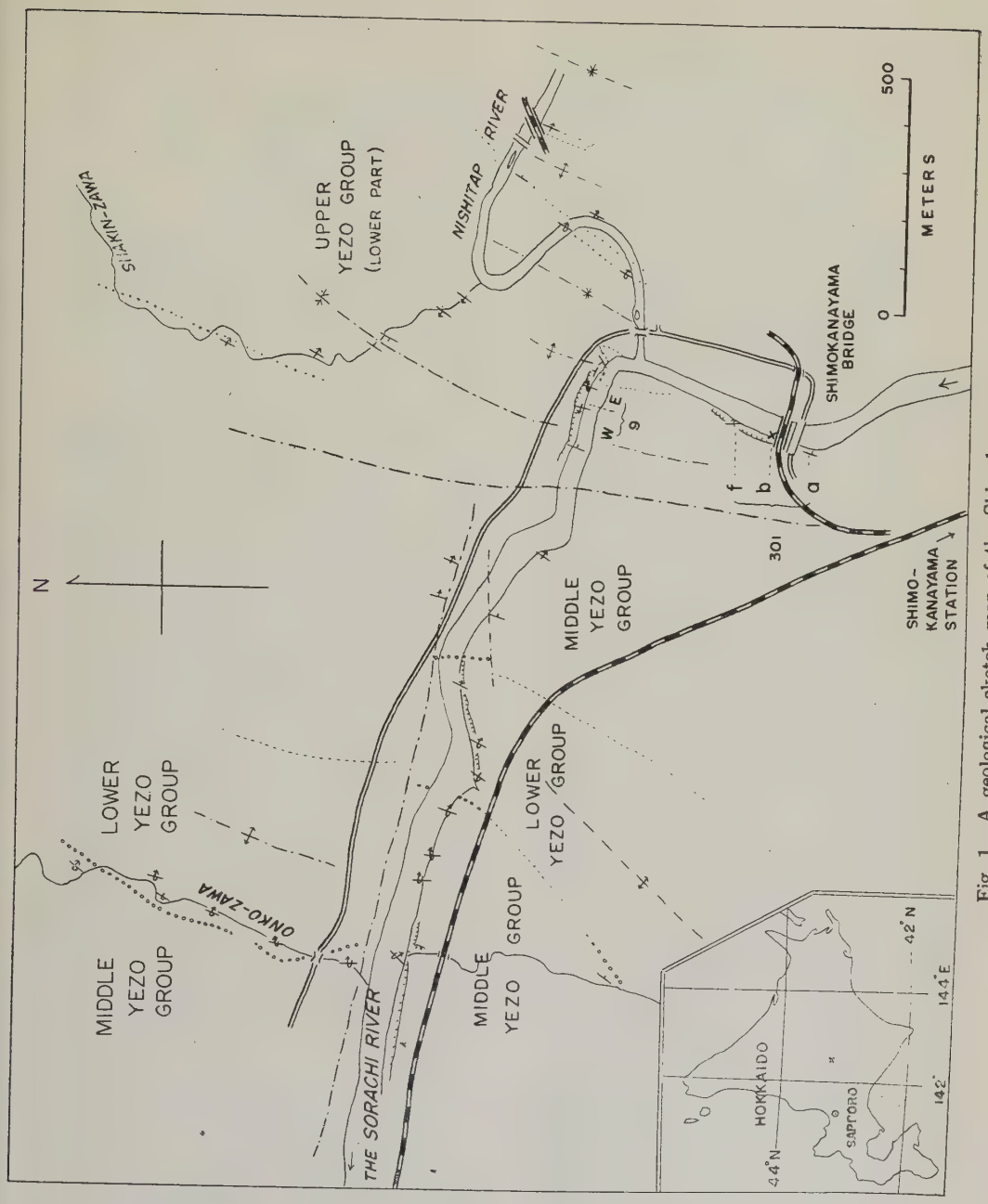

Fig. 1. A geological sketch map of the Shimokanayama area

Mesopuzosia pacifica MATSUMOTO MS*, immature specimens of the first species, *Inoceramus hobetsensis* NAGAO and MATSUMOTO and *Inoceramus incertus* JIMBO

* A monograph of the Puzosidae in Hokkaido and Saghalien is now in preparation, and will be published in the near future.

have been collected throughout the whole thickness. The mudstone in the northeastern part of the exposure is somewhat sandy with sandy laminae intercalated.

After an interruption by the river gravel of the Sorachi the strata are exposed again at loc. KY 9 on the right side of the Sorachi about 150 m. below the mouth of the tributary Nishitap. The exposure presents a continuous section totalling 70 m. in thickness, of which the western half consists of mudstone rich in calcareous nodules and the eastern half mudstone and sandstone in frequent alternation. The western mudstone contains sporadically *Inoceramus* cfr. *hobetsensis* NAGAO and MATSUMOTO, *Inoceramus incertus* JIMBO and a large form of *Mesopuzosia yubarense* (JIMBO) em., while the eastern mudstone interbedded with sandstone has a fossiliferous bed rich in *Inoceramus incertus* JIMBO. Among the variable forms of *Inoceramus incertus* JIMBO there is one which resembles quite well *Inoceramus labiatus* SCHLOTHEIM, a world-wide guide fossil to the lower Turonian. The western mudstone of the second locality is situated just on the northern extension from the mudstone of the first locality. The surface of the interbedded sandstone is provided with markings which suggest that the eastern side was originally lower. The detailed geological survey by HASHIMOTO has succeeded to prove that the exposed part under discussion is situated near the axial part of an isoclinal syncline. Somewhat eastward at a locality along the Nishitap-zawa a large form of *Inoceramus hobetsensis* NAGAO and MATSUMOTO was collected. Thus the fossiliferous part under discussion is referable to the lower part of the Upper Yezo group* and in date belongs to the upper Gyliakian—probably the earlier portion.

As will be described in detail below, the fossil in question is referred to the genus *Pseudaspidoceras* HYATT, which is intimately related to *Mammites* and belongs to the Mammitinae. This genus is known from the lower Turonian of Tunis and southeastern part of France, the Utatur group of Southern India**, lower Turonion equivalent of Egypt, Syria and Portugal, and the Turonian of Madagascar and Brazil (Province of Sergipe) being one of the characteristic elements in the Mediterranean region and its extended area. Late Dr. S. SHIMIZU (1935) listed *Pseudaspidoceras* aff. *armatum* PERVINQUIÈRE from the Cretaceous of the Naibuchi valley, South Saghalien, but he did not describe or illustrate the specimen. Although the specimen at their disposal is not in perfect state of preservation, the writers believe that its occurrence deserves reporting.

Briefly the find of *Pseudaspidoceras* from the Cretaceous deposits of Hokkaido, Japan is interesting in that the fossil offers positive evidence of international correlation and of paleogeographical relations which have been suggested already on other grounds, namely that the lower part of the lower Gyliakian, in which *Pseudaspidoceras* was found and *Inoceramus incertus* JIMBO is com-

* In accordance with the stratigraphical nomenclature Upper Ammonite group was revised as Upper Yezo group. (see T. MATSUMOTO 1951)

** The Indian species *Pseudaspidoceras footeanum* (STOLICZKA) is said to have been derived from the Cenomanian part of the Utatur group, while most of other forms in Europe, Africa, and Syria occur in the Turonian, and especially in Europe the lower Turonian.

mon, is most probably correlated to the lower Turonian*. In this substage the immigrants of some Mammitinae and Vascoceratidae from the Tethys region to the Pacific realm are found in the northern Pacific region.

Before entering further the writers wish to record a debt of gratitude to Mr. C. W. WRIGHT in London for his kindness of reading the typescript and giving them good criticisms.

Systematic Description

Order Ammonitidea DE HAAN 1825

Family Acanthoceratidae DE GROSSOUVRE 1894

Subfamily Mammitinae HYATT 1900

Genus *Pseudaspidoceras* HYATT 1903

(genotype *Ammonites footeanus* (BLANFORD MS) STOLICZKA, 1865)

Pseudaspidoceras sorachiense MATSUMOTO and HASHIMOTO, n. sp.

Pl. 10, figs. 1a, b

Material:—A single internal mould of an outer whorl, somewhat deformed secondarily. Inner whorls invisible owing to unfavorable preservation.

Specific diagnosis:—A species of *Pseudaspidoceras* characterized by a comparatively large size for the genus, slow increase of whorl-size with growth, little overlap of whorls, compressed whorl-section, and widely separated ribs in the living chamber. (In the last half volution there are 8 ribs while the preceding part is a little more frequently costate.) The tubercles on the ribs consists of a nodose one situated on the inner half of flank but not at the umbilical shoulder, a ventro-lateral one, prominent and with spirally elongated base, and an external one situated near the median line of the venter. The tubercles of the last rib are obsolete. The wide interspaces of ribs are weakly ornamented with numerous striae and a few subcostae of unequal strength. Ribs and striae run radially on flank and show a gentle backward curvature on venter, suggesting a shallow hyponomic sinus. Suture-line acanthoceratoid (the detailed pattern is not yet precisely known owing to unfavorable preseavation). The water-worn internal mould of the phragmocone presents a pseudokeel which suggests a relatively strong siphuncle.

Type:—Sp. Reg. No. GK. H 4023, deposited at the Department of Geology, Kyushu University. This is the holotype.

Measurements:—
(with an approximate estimation of the somewhat deformed part.) (mm.)

Diameter	Umbilicus
180	82 (45.5%)
Height of whorl	Breadth of whorl
50±	30± (?)

Remarks:—The observable part of the shell resembles in general aspect *Pseudaspidoceras armatum* PERVINQUIÈRE (PERVINQUIÈRE 1907, p. 317, Pl. XIX, figs. 2–4), *Ps. footeanum* (STOLICZKA) (STOLICZKA 1865, p. 101, Pl. LII, figs. 1, 2) and *Ps. salmuriense* COURTILLER with variety *byzacenica* PERVINQUIÈRE (COURTILLER 1867, p. 6, Pl. VI, figs. 1–4, inaccessible to the writers; PERVINQUIÈRE 1907, p 314, Pl. XIX, fig. 1).

* The problem of international correlation as to the Cretaceous of Japan was discussed more comprehensively by T. MATSUMOTO (1942-43) and will be found in a monograph to be published in the near future. (T. MATSUMOTO and others. The Cretaceous System in the Japanese Islands, in preparation.)

In the ornamentation the present form is very similar to the first species, but it is slower in growth, somewhat larger, and provided with wider umbilicus and much compressed whorl.

The second species, which occurred geographically nearer to Japan than other two species, is far more different from the present species in its narrower umbilicus, much more rapid increase of whorls with growth, somewhat depressed and coronate whorl, and the position of the inner row of tubercle at the umbilical shoulder.

The third species is the most similar to the present species in its size and shell-form,——wide umbilicus, little overlap of whorls, and compressed whorl-section. In the present form the increase of whorl is still slower than in the third species. Furthermore, the ribs on the living chamber of the Japanese species are more widely separated than those of *Ps. salmuriense* and *Ps. armatum*. In this respect the present form resembles *Ps. footeanum*. Interruption of ribs between the inner and ventro-lateral tubercles, which is found in adult shell of *Ps. salmuriense* var. *byzacenica* PERVINQUIÈRE is not found in the present form.

From all these reasons the writers are inclined to separate the present form as a new species, although the material is somewhat unfavorable in preservation.

Locality and horizon:—Loc. KY 301b, 25 m. downstream below the Shimo-Kanayama Bridge, on the left side of the Sorachi river, Minami-furano-mura, Sorachi-gun, Ishikari Province, Hokkaido; Lat. 43°12′ N, long. 142°25′ E. (Coll. by W. HASHIMOTO, 1951). The lower part of the Upper Yezo group in this district; the Upper Gyliakian.

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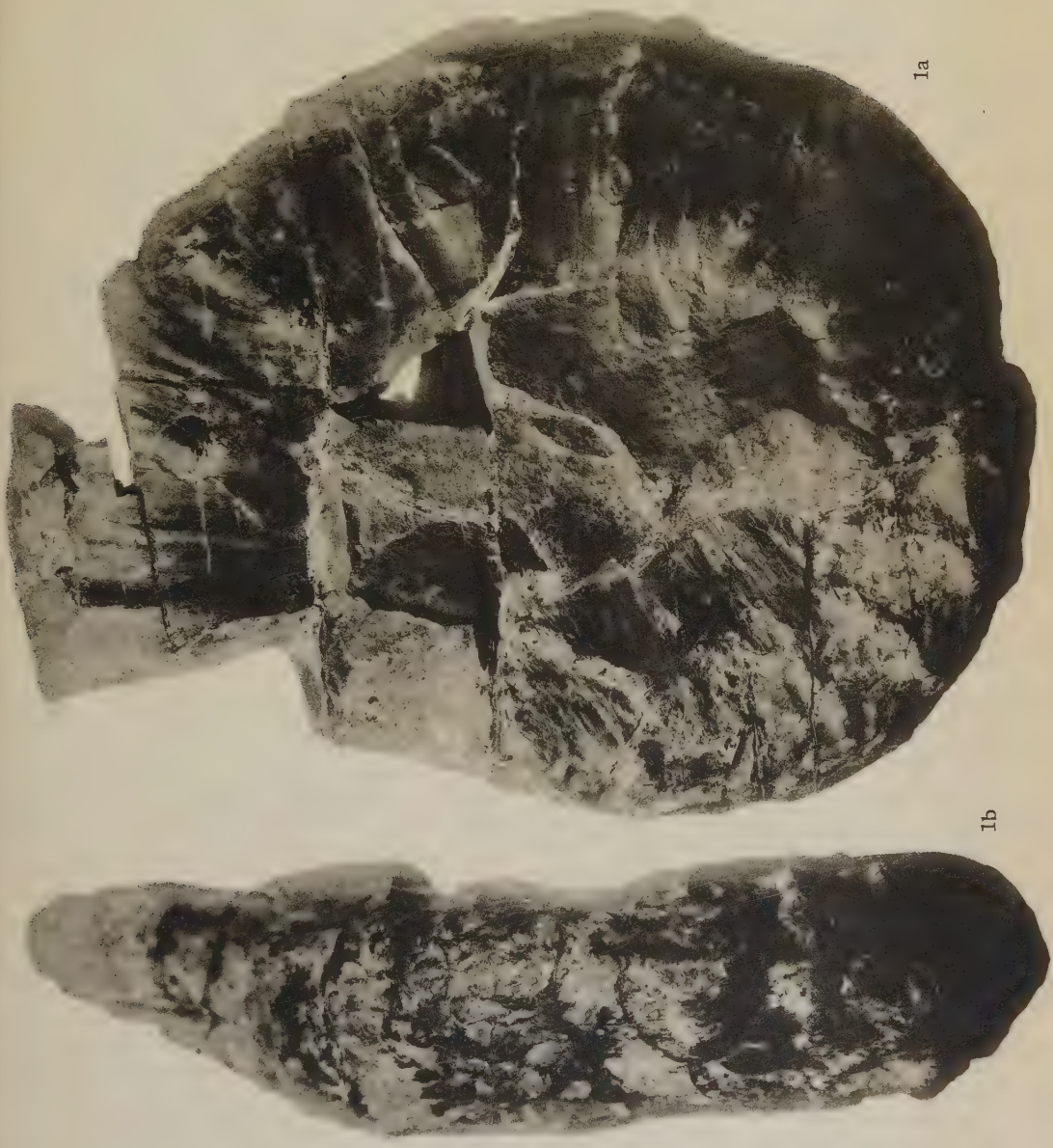

Explanation of Plate 10

Fig. 1 a,b. *Pseudaspidoceras sorachiense* MATSUMOTO and HASHIMOTO n. sp.
Lateral and frontal views, ×1.
Sp. Reg. No. GK. H4023, Loc. KY301b, Shimo-Kanayama, Sorachi-gun, Ishikari Province. Hokkaidô. ×1. (C. UEKI Photo.)

Trans. Proc. Palaeont. Soc. Japan, N.S., No. 12, pp. 103—110, Pl. 11, 3 text-figs., Dec. 15, 1953

241. NEW *BOULTONIA* AND OTHER MICROFOSSILS FROM NORTH THAILAND (SIAM).*

To the Memory of the late Mr. Ichiro YOSHIMURA

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北タイ産 *Boultonia* 其他の微化石：地質学上の資料が乏しいとされているタイ・ビルマ国境附近に関する新知識として，故吉村一郎学士が北タイ，メイホンソン州，バンドン区パイ近傍の石灰岩より採集された岩片（spergenite）中に含まれる石灰藻1属（*Epimastopora*）と紡錘虫5属（*Boultonia, Oketaella, Triticites, Rugosofusulina* 及び *Schwagerina*）を記載し，その結果から同石灰岩（パイ石灰岩と呼ぶ）を二畳紀初期の所産と推定した。*Epimastopora* は生層位学的観点から，*Boultonia* としたものは形態的特徴から，共に注目を惹く。本小篇を謹んで吉村一郎氏の靈に捧げる。小西健二

A few microfossils from the Burmo-Tai borderland are described here with the hope of their being an addition to the meager knowledge on the geology of the terrain. The material was procured by Mr. YOSHIMURA at a locality near Pai, Bandon Prov., Mayphongson Pref., North Tai, ca. 110 km. NW of M. Jien Hmai, and it was sent to Professor KOBAYASHI, University of Tokyo, together with a geologic route map. (See Text-figs. 1-2.)

Here the writer expresses his most sincere thanks to Professor T. KOBAYASHI for his encouragement and supervision in this study and to Professor J. H. JOHNSON, Colorado School of Mines, for his invaluable advices on the study of algae. This paper is dedicated to the late Mr. Ichiro YOSHIMURA for his memory.

Among several reports on the "Permo-Carboniferous" faunas of Burma and Tai, there are a few dealing with fusulines.

From "Kyuanktang limestone" or "limestone series of the Moulmein group" on a hill near Therabwin, Tenasserim, NOETLING (1893) has described *Schwagerina oldhami*, sp. nov., with *Lonsdaleia salinaria* WAAG. et WENTZ. and various other fossils. As described and illustrated is only its external appearance, it is difficult to give any adequate comment. The writer, however, contends that the fauna must be Permian rather than Carboniferous; because *Schwagerina* in the old sense has been reclassified into several Permian genera. Truly, NOETLING compared *S. oldhami* with *Schwagerina* (=*Verbeekina*) *verbeeki* as an allied species. It may be a further proof of this contention that *L. salinaria* (=*Wentzelella timorica*; MINATO, 1944) occurs with *S. oldhami*.

"*Fusulina elongata*" and other Permian fossils are reported from several localities in North Shan States by LA TOUCHE (1913). It appears to the writer to be quite probable that some of them, at the least, belong to *Polydiexodina*.

In a bowlder from an equivalent (?) of the Pawa limestone in North Tai, collected near Bandara by HEIM and HIRSCHI, DUNBAR

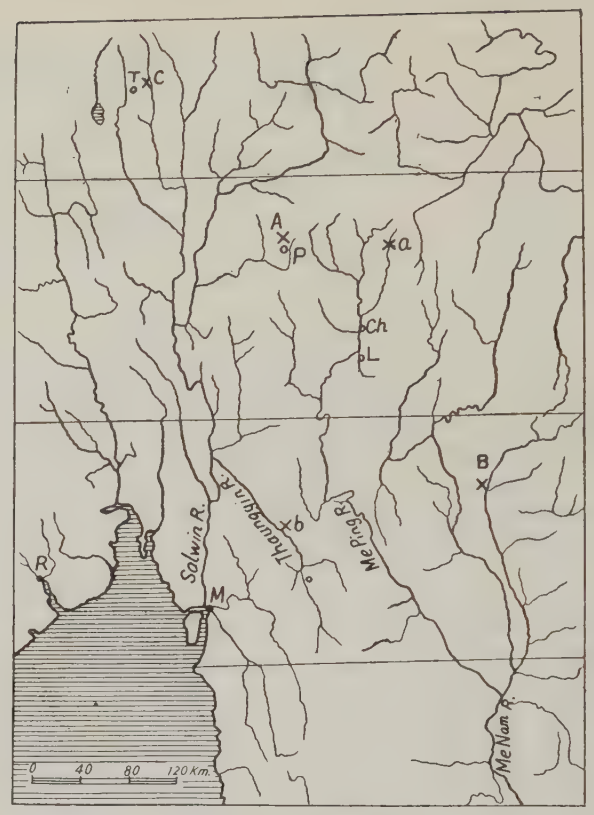
* Read Feb. 9, 1952; received March 26, 1953

(1939) found *Neoschwagerina craticulifera, Verbeekina verbeeki, Pseudofusulina* (=*Schwagerina*?) *douvillei*, and *Sumatrina annae*. They as a whole indicate the Zone of *Verbeekina-Neoschwagerina*.

Subsequently TORIYAMA (1942) described *Pseudoschwagerina turbida* K. et K., *P. taiensis*, sp. nov., *P.* (?) sp., and *Fusulinella* (=*Schubertella* ?) cfr. *chaoi*, from Zone of *Pseudoschwagerina* near Ban Doi Hoato and Ban Ai, about 80 km. NNE of M. Jien Hmai.

Finally, *Holosporella siamensis* PIA (1930), a Triassic dasycladacea, from Kamawkala limestone on the Thaungyin River, is the sole fossil calcareous alga, so far known from this region.

YOSHIMURA made the geologic observations along the route in Text-fig. 2, as follows.



Text-fig. 1. Locality map.

A; Pai limestone: a; fossil locality in TORIYAMA (1942) & MINATO (1944): b; fossil locality in PIA (1930): c; one of the fossil localities in LA TOUCHE (1913): B; Bandara: Ch; Chieng-mai: L; Lampoon: M; Moulmein: P; Pai: R; Rangoon: T; Taunggyi.

4. Gravel bed (Holocene)

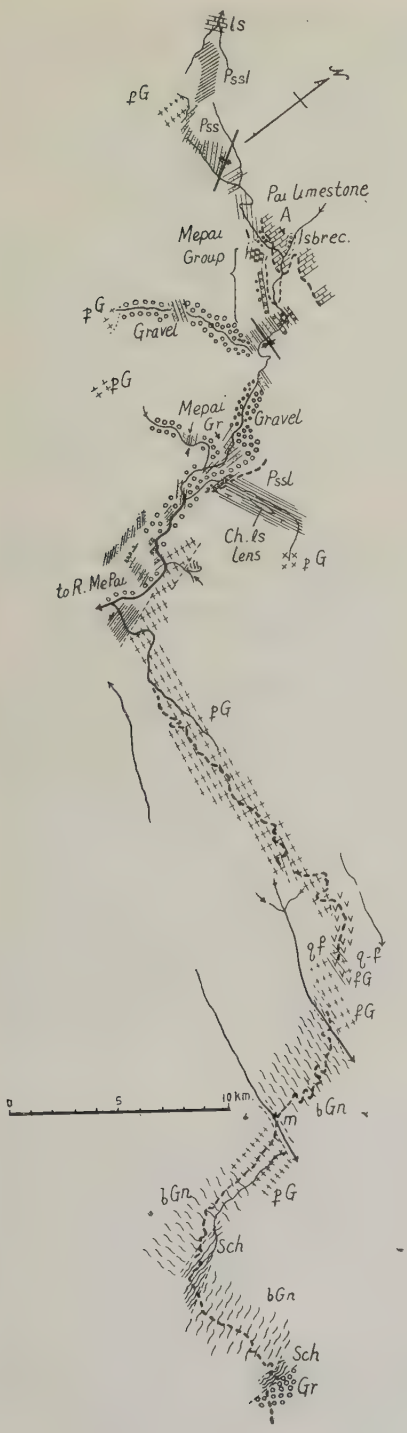
~~~~~unconformity~~~~~~~~~~~~

3. "Mepai group" { Alternation of conglomerate, sandstone, and slate.
Conglomerate
~disconformity~~~~~~~~~~~~
Reddish conglomerate

~~~~unconformity~~~~~~~~~~~~

2. Alternation of sandstone and slate, with intercalations of lenses of limestone, chert, and reddish marl.

1. Pai limestone formation (Permian)



Beside them, there are biotite-Augen-gneiss and mica-schist; the Pai limestone formation thrusts itself upon the 2 and the 3 formations; the 2 formation is intruded by "porphyritic biotite-granite".

Among 30 thin sections from the Pai limestone 15 are labelled by KOBAYASHI as 123K (1—15), 7 124Ka (1—3, 5—8), and 8 124Kb (1—8), all containing microfossils abundantly. Ten species distinguished in them are tabulated in the next page.

As clearly shown in the table, three groups of sections contain an identical faunule. Although there is no Pseudoschwagerine in the collection, the fossil assemblage belongs probably to the Zone of *Pseudoschwagerina*. It may be also noticeable that the faunule is related to the Early Permian ones in South China as shown in association of *Schwagerina* cfr. *kueichouensis* (CHEN) and *Triticites truncatus* CHEN.

Finally, the Pai limestone reveals spergenitic texture. It comprises shell fragments of brachiopods and gastropods, bryozoans, and stem-joints of crinoids, beside ooliths and microfossils. (Figs. 13 & 19)

Text-fig. 2. YOSHIMURA's geologic route map near the Pai limestone.

bGn—biotite-Augen-gneiss; *Sch*—mica-schist; *pG*—porphyritic granite; *q-p* - quartz-porphyry; *ch*—chert with limestone lenses; *Pss*—Palaeozoic sandstone; *Pssl*—Palaeozoic sandstone & slate; *Mepai Group*; *ls brec*—limestone breccia; *Gravel*.
(300000; 1).

Point *m* in the map is ca. 60 km. NW of *Wentzelella* locality discovered by NAITO. (*Wentzelella* locality is the summit of the pass between Ban Doi Hoato and Ban Ai, ca. 80 km. NNE of M. Jien Hmai).
(TORIYAMA, 1942; p. 243).

	123K	124Ka	124Kb	Plate 11
Epimastopora yoshimurai, sp. nov.	*	*	*	Figs. 16–18 & 19c.
Cribrogenerina aff. *vermiculata* LANGE	*	*	*	Not illustr.
Tetrataxis sp.	*	*	*	Not illustr.
Boultonia truncata, sp. nov.	*	*	*	Figs. 1–8
B. sp.	*	—	*	Figs. 9 & 19a.
Oketaella sp.	*	—	—	Fig. 10
Triticites spp. indet.	*	*	*	Figs. 11, 12, 13a & 19b.
Rugosofusulina sp. indet.	—	—	*	Fig. 14
Schwagerina cfr. *kueichouensis* (CHEN)	*	?	?	Fig. 15
Schwagerina sp. indet.	—	*	—	Fig. 13b

Description of Microfossils

Genus *Epimastopora* PIA, 1922

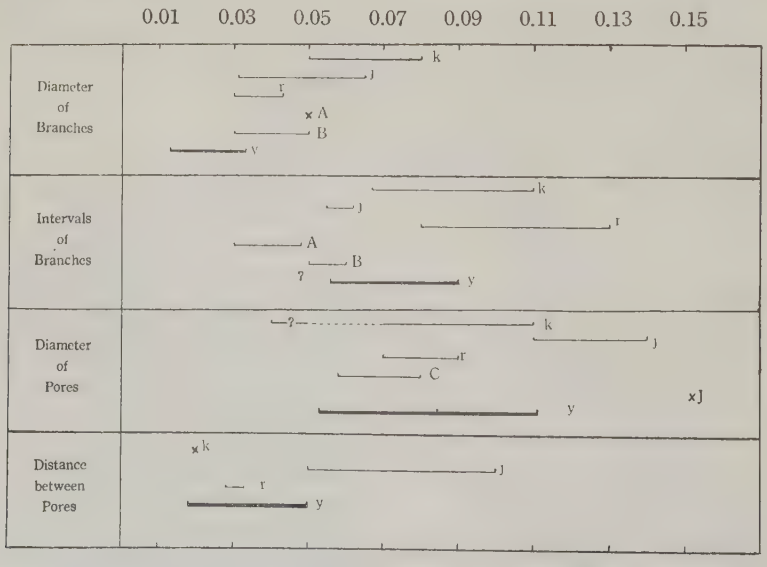
The genus has been reported to occur in Europe (GORTANI, 1906; PIA, 1922 & '37), U. S. A. (JOHNSON, 1946), and Japan (ENDO, 1951), in the range from Middle Pennsylvanian to Lower Permian (Wolfcampian). A new species of Pai is not an exception, in so far as the age can be judged from its associates.

Epimastopora yoshimurai, sp. nov.

Figs. 16–18 and 19c.

Material: About 23 small fragments—15 from 123K, 3 from 124Ka, and 5 from 124Kb—in fossiliferous limestone near Pai, North Tai.

Description: Fragments of thallus mostly long, narrow and straight, generally 1–3 mm. in length and 0.35–0.55mm. in width. Branches slender, 0.013–0.033mm.



Text-fig. 3. Comparison of *E. yoshimurai* (y) with the species previously described. k; *E. kansasensis*: j; *E. jewetti*: r; *E. regularis*: A; *E.* sp. A JOHNSON: B; *E.* sp. B JOHNS.: C; *E.* sp. C JOHNS.: J; *E. japonica.*

in diameter, or 0.25 mm. on an average and somewhat irregularly spaced with intervals of 0.054–0.090 mm. Surface of thallus perforated by elliptical outlets of tubular pores which are closely and irregularly spaced. Diameter and distance of the pores strongly variable, respectively in the range from 0.015 (?) to 0.060 mm. and from 0.015 to 0.050mm. Branches of different orders indistinguishable; sporangium and entire thallus unknown.

Comparison: As shown in Text-fig. 3, *E. yoshimurai* has more slender branches than any other species of the genus.

Cotypes: PP7202: *slides;* 123K 6–7, and 124Kb 3.

Genus *Boultonia* LEE, 1927

Boultonia truncata, sp. nov.

Figs. 1-8

Material: 3 axial, 2 tangential, 3 eccentric axial, 2 sagittal, 2 parallel, and some oblique sections.

Description: Shell very minute, fusiform; volutions sharply pointed at poles except the last one with abruptly truncated poles; axis of coiling straight. Mature specimens composed of 5 to 5 1/2 volutions, 0.77 to 1.00 mm. in length and 0.25 to 0.40 mm. in width; form ratio of the last volution 2.41 to 2.95. Coiling axis of 2 or 3 juvenile volutions, forming a large angle, apparently perpendicular, with the main axis of outer volutions. Proloculus very small, spherical, having an outside diameter of 0.037 mm. Height of chambers in 4 volutions, in the third to the sixth are 0.0198, 0.0291, 0.0398, and 0.0558 in the mean between two specimens. Spirotheca very thin, structureless, and less than 0.015 mm. Septa exceedingly thin, thinner than wall, widely spaced and about twenty in number in the last volution; septal fluting fairly regular and uniform throughout the shell, but the wave of fluting does not exceed the mid-height of each chamber. Tunnel narrow; chomata asymmetrical and distinct in the last one or two volutions.

Comparison: Judging from the above-mentioned characters, the species may be related to *Boultonia* or *Codonofusiella* most closely. It is tentatively referred to the former, because no uncoiled whorl as characteristically seen in gerontic stage of the latter genus is recognizable (THOMPSON, 1948; THOMPSON & VERVILLE, 1950; THOMPSON, WHEELER & DANNER, 1950). The following species have been referred to the two genera.

Original generic reference	Present generic reference
cascadensis, Boultonia THOMPSON, WHEELER et DANNER, 1950	*Boultonia*
cylindrica, Boultonia CHEN, 1934-a	*Schubertella* or *Boultonia*
duffelli, Codonofusiella THOMPSON, WHEELER et DANNER, 1950	*Codonofusiella*
gracilis, Schellwienia OZAWA, 1927	*Boultonia ?*
nama, Codonofusiella ERK, 1942	*)
paradoxica, Codonofusiella DUNBAR et SKINNER,	*Codonofusiella* (genotype)
rawi, Boultonia LEE, 1927	*Wedekindellina*
willsi, Boultonia LEE, 1927	*Boultonia* (genotype)
Codonofusiella ? sp. A THOMPSON et VERVILLE, 1950	*Codonofusiella* or *Boultonia*

*) Neither description nor illustration of the species is accessible to the writer.

The species from Tai differs from *Schellwienia gracilis* as well as *Codonofusiella?* sp. A. THOMPSON et VERVILLE in size. *B. truncata* is distinguishable from *B. cylindrica* by its stronger septal fluting and thinner spirotheca, and from *B. cascadensis* by its more slender outline of shell and polar truncation of the last whorl.

Cotypes: PF7203; *slides*, 123K 5-8, 12, & 14, 124Ka 6 & 8, and 124Kb 1.

Boultonia sp.

Figs. 9 and 19a.

There are three extraordinarily elongate boultonians in the collection. They have sharply pointed poles on the last whorl and their form ratios are 4.07, 4.31, and 4.73. Length, 1.40 to 1.65 mm.; width, 0.33 to 0.38 mm.

This form is different from the preceding in form ratio, although they are similar in spirothecal structure, distinct chomata, and relatively intense septal fluting. In the slender shape, *Schellwienia* (=*Boultonia?*) *gracilis* OZAWA (1927; pp. 83-84, pl. VII, figs. 5-6) is the closest to it but they are not identical with each other. Because it is associated with *B. truncata*, occurs less commonly, and is much larger and more elongate, it is not improbable that *B.* sp. is the microspheric form of *B. truncata*, although no axial section is unfortunately found in the collection.

Slides: 123K6-8.

Genus *Oketaella* THOMPSON, 1951

Oketaella sp.

Fig. 10

One axial and one oblique cross sections at hand. Shell 0.963 mm. in length, 0.365 mm. in width and composed of 3 volutions; outside diameter of proloculus 0.083 mm. Spirotheca in the three volutions 0.0142, 0.0185, and 0.0232 mm. in thickness. Illustrated specimen is encrusted by an oölith of 1.034 mm. in longer diameter.

This is closest to the genotypic *Oketaella fryei* from the Wolfcampian, though they are specifically distinct.

Slides: 123K 6 and 124Ka 3.

Genus *Triticites* GIRTY, 1904

Triticites spp. indet.

Figs. 11, 12, 13a, and 19b.

Because all specimens referable to the genus are represented by oblique sections, any specific identification cannot be made. It is, however, quite probable that the one (Fig. 19b) may be identifiable with *T. truncatus* from the Mapin limestone of Kwansi and the Swine limestone of Chekiang (CHEN, 1934-b).

Slides: 124Ka 5 (Fig. 11) and 123 K4, 6 (Fig. 19b), 7, & 8.

Genus *Rugosofusulina* RAUSER-CHERNOUSOVA, 1937

Rugosofusulina sp.

Fig. 14

A fusuline in a somewhat obliquely eccentric but near-axial section from 124Kb belongs to the genus, because of its undulated outline, rugosity of spirotheca, and irregularly and highly fluted septa. Length, 2.150 mm.; width, 0.946 mm.; number of volutions 5 1/2. *Rugosofusulina* (?) sp. DUNBAR et MISCH (1947) is quite similar to the form, though the former is larger.

Slide: 124Kb 7.

Genus *Schwagerina* Möller, 1877 em. Thompson, 1948

Schwagerina cfr. *kueichouensis* (Chen)

Fig. 15

Cfr. 1934 *Triticites kueichouensis* Chen; *Palaeont. Sinica, vol. IV, fasc. 2*, pp. 42–43, pl. V, fig. 16 (17?)

This is represented by 1 axial, a few cross and some oblique sections. This form closely resembles *Schwagerina kueichouensis* originally referred to *Triticites* by Chen. His specimen was obtained from the Chihsia limestone but the Siamese form may be a little older.

Length, 4.664 mm.; width, 2.398 mm.; number of volutions, 5 1/2. Diameter of proloculus, 0.174 mm.; thickness of spirotheca from the first to the fifth volutions 0.016, 0.034, 0.067, 0.100, and 0.131 mm.

Cotypes: PF7204, *slides*, 123K 5 & 9.

Schwagerina sp. indet.

Fig. 13b.

An eccentric axial section, specifically distinct from the preceding by having an elliptic outline the median part of which is flattened, and by having more regularly and deeply fluted septa. *Slide*: 124Ka 8.

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Explanation of Plate 11.

Figs. 1-8. *Boultonia truncata* KONISHI, sp. nov. ..... p. 107
Fig. 1. Imperfect axial section showing the truncation of the last whorl, see also in Figs. 4 & 5. (×40); Figs. 2 & 3. Axial sections. The latter showing that the coiling axes of inner volutions are apparently perpendicular to those of outer ones. (×20); Fig. 4. Eccentric axial section. (×10); Fig. 5. Same section as in Fig. 4. (×20); Fig. 6. Imperfect near-axial section. (×20); Fig. 7. Sagittal section of a specimen at the center of an öolith. (×40); Fig. 8. Oblique cross-section apparently resembling *Codonofusiella*. (×40)

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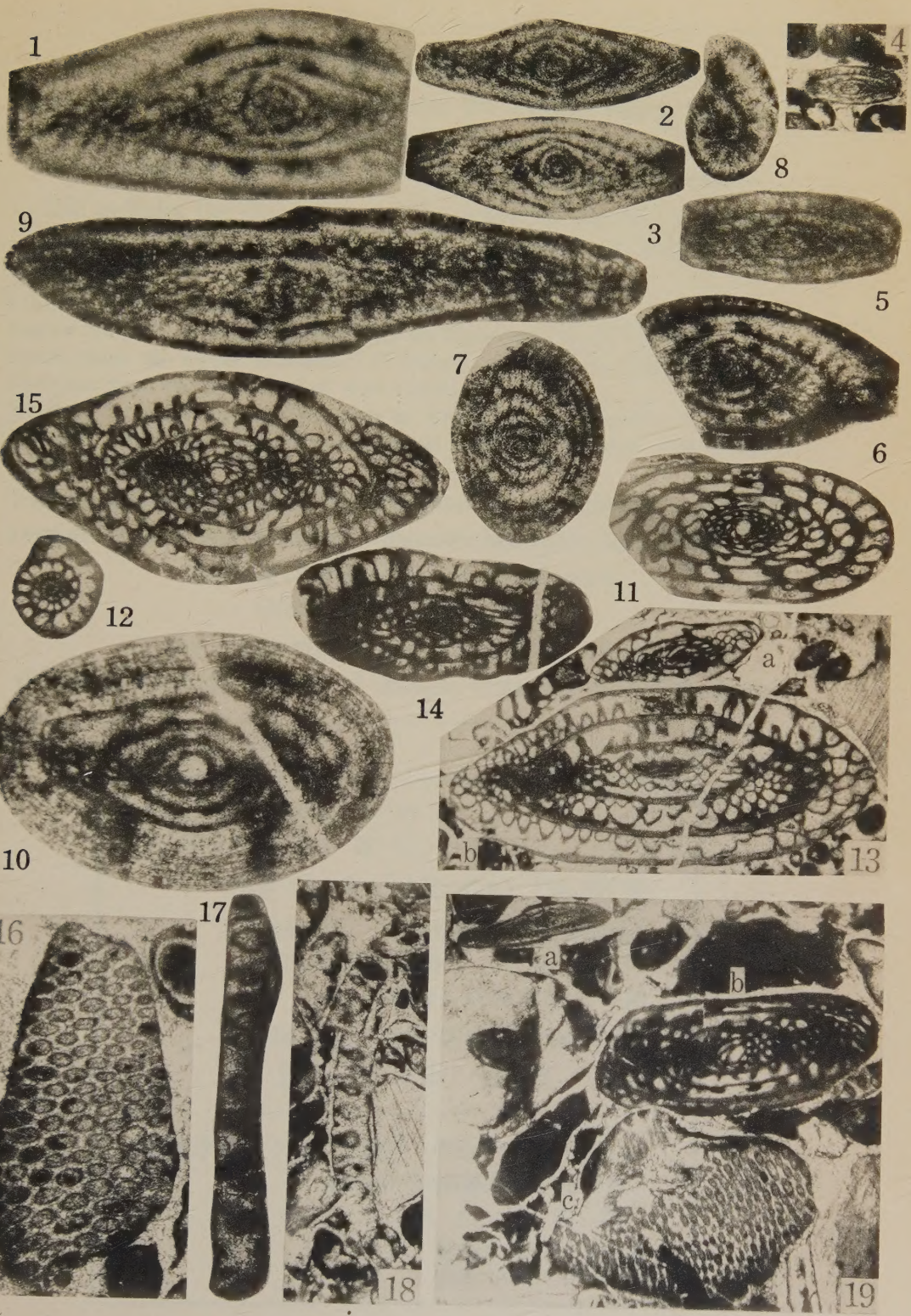

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CONSTITUTION
of the
PALAEONTOLOGICAL SOCIETY OF JAPAN

ARTICLE 1. Name

The Society shall be known as the Palaeontological Society of Japan. The Society is a section of the Geological Society of Japan.

ARTICLE 2. Object

The object of the Society shall be to promote the study of palaeontology and related sciences.

ARTICLE 3. Achievement

The Society in order to execute Article 2 shall (a) issue the Society journal and other publications, (b) hold or sponsor scientific lectures and meetings, and (c) sponsor collecting or field trips, and lectures.

ARTICLE 4. Membership

The Society shall be composed of persons who are active of interested in palaeontology or related sciences, and shall be known as regular members, honorary members, and patrons.

ARTICLE 5. The members of the Society shall be obliged to pay annual dues to the Society, for which they shall enjoy the privilege of receiving the Society's journal and of submitting papers which have been read and discussed at the meetings for publication in the Society's journal.

ARTICLE 6. Administration

The Society shall have the following organizations for its administration.

(a) General meeting. The general meeting shall be composed of the Society members. More than one tenth of regular members shall be present to hold general meetings. Administrative affairs shall be decided during the general meeting.

(b) President. The president shall be elected from among the regular members. The president shall represent the Society and supervise its business matters.

(c) Council. The council shall be composed of councillors who are elected from among the regular members. The council shall discuss administrative affairs.

(d) Business council. The business councillors shall be elected from among the council members, and shall administer business affairs.

(e) Officers shall be elected by vote of returned mail ballots, as a general rule.

ARTICLE 7. Amendments to the constitution shall be by decision of the general meeting.

By-Laws and Administration

ARTICLE 8. The Society's journal shall be issued three times a year.

ARTICLE 9. Regular members shall be persons who have knowledge, experience, or interest in palaeontology or related sciences.

ARTICLE 10. Patrons shall be selected individuals or organizations who give special support to the objectives of the Society.

ARTICLE 11. Honorary members shall be persons of distinguished achievement in palaeontology. The council shall nominate honorary members for decision by the general meeting.

ARTICLE 12. Applicants for membership to the Society shall submit their full name, mailing address, date of birth, occupation, and name of school from which they graduated.

Dues

ARTICLE 13. Rates for annual dues of the Society shall be decided during the general meeting. Annual dues for regular members is Yen 400.00 (domestic members) and U.S. $2.00 (foreign members). Patrons are individuals or organizations donating more than Yen 10,000.00 annually. Honorary members are free from obligations.

ARTICLE 14. The Society income shall be from membership dues and bestowals.

ARTICLE 15. The Society shall have one chairman, fifteen councillors, and several business councillors, whose term of office shall be two years. They may be re-elected.

Addendum

ARTICLE 1. There shall be four business councillors for the present.

ARTICLE 2. The Society journal shall be issued three times a year for the present.